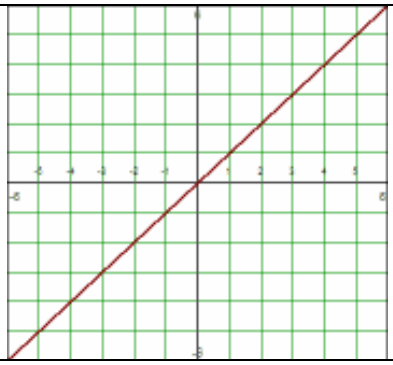
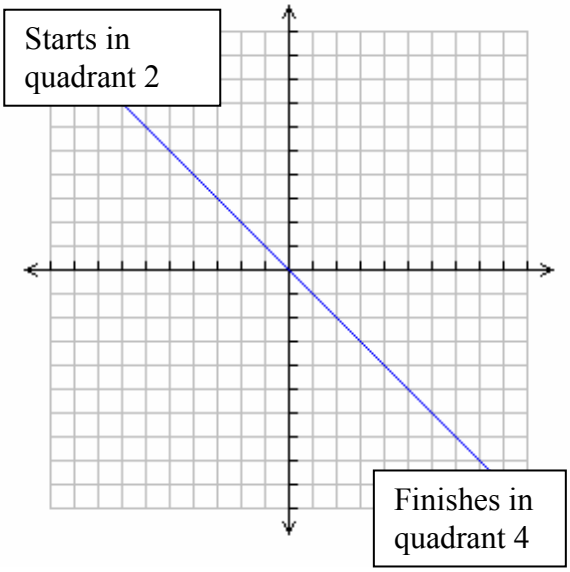
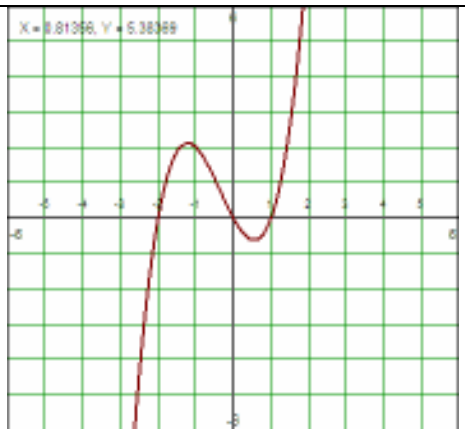
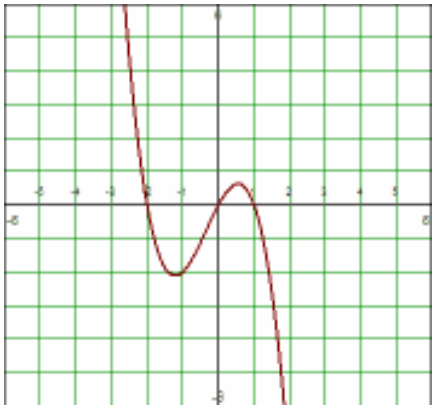
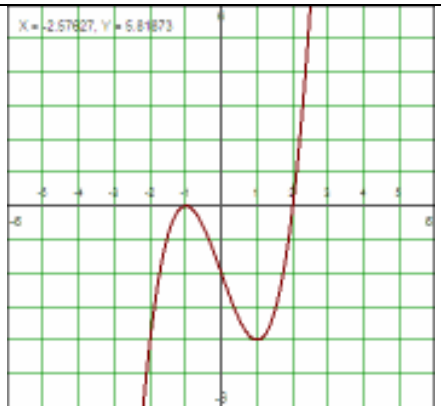
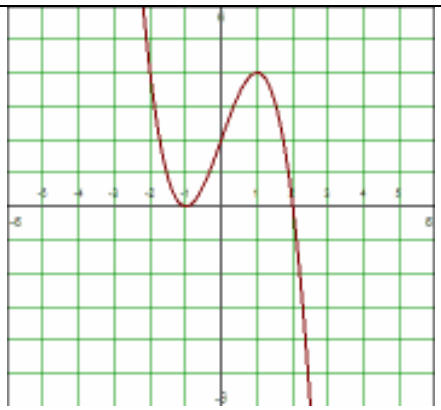
Time to investigate polynomial functions:

Part 1: Fill-in the chart below and look for any emerging patterns. Use GraphCalc to graph the functions. Function #2 has been completed for you. Use it as your model.:

Polynomial Function	Sketch of the function	Degree	Sign (positive or negative function)	Start and end Quadrants (left → right)
$y = x$		Odd degree of 1	Positive	3 to 1
$y = -x$		Odd (first degree polynomial	Negative	$2 \rightarrow 4$

$y = x(x-1)(x+2)$		Odd – degree of 3	Positive	2 to 4
$y = -x(x-1)(x+2)$		Odd – degree of 3	Negative	2 to 4
$y = (x+1)^2(x-2)$		Odd – degree of 3	Positive	1 to 3
$y = -(x+1)^2(x-2)$		Odd – degree of 3	Negative	2 to 4

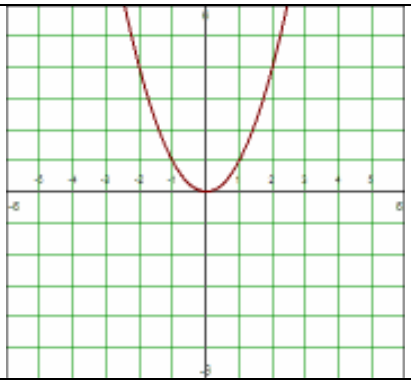
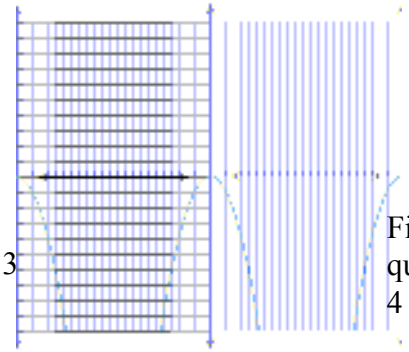
Complete the following sentences:

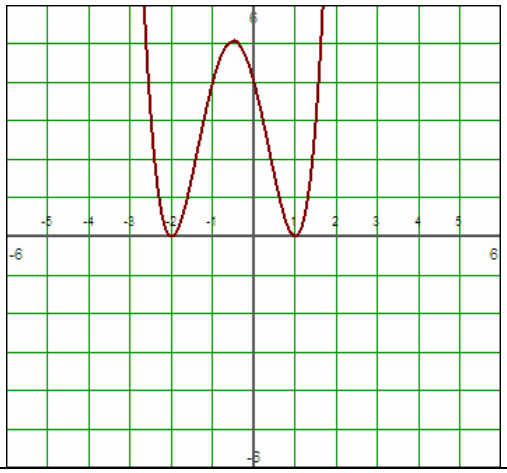
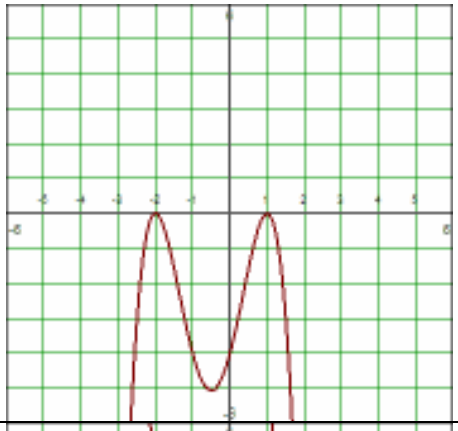
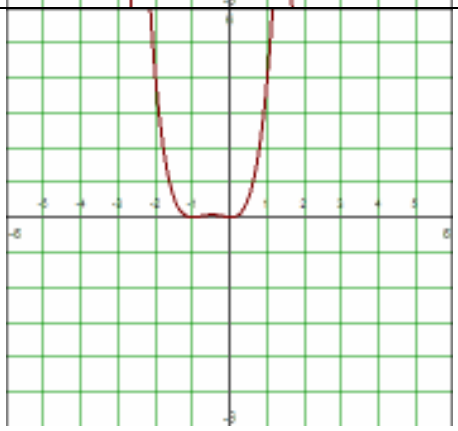
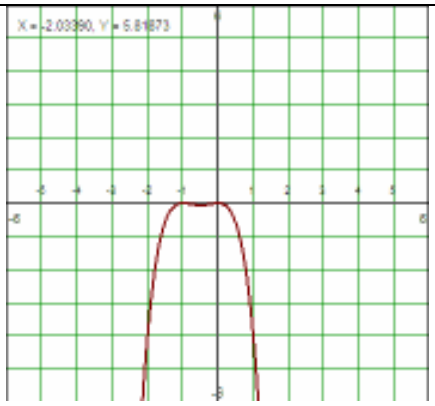
1. When a polynomial function is **odd** and **negative,** it starts in quadrant __2___ and end in quadrant _____4__ moving left to right.

2. When a polynomial function is **odd** and **positive,** it starts in quadrant ___1__ and end in quadrant _____3__ moving left to right.

Time to investigate polynomial functions

Part 2: Fill-in the chart below and look for any emerging patterns. Use GraphCalc to graph the functions. Function #2 has been completed for you. Use it as your model.:

Polynomial Functions	Sketch of the function	Degree	Sign (positive or negative function)	Quadrants (left → right)
$y = x^2$		Even – degree of 2	Positive	2 to 1
$y = -x^2$	Starts in quadrant 3  Finishes quadrant 4	Even (second degree polynomial	Negative	$3 \rightarrow 4$

$y=(x-1)^2(x+2)^2$		Even – degree 4	Positive	2 to 1
$y=-(x-1)^2(x+2)^2$		Even – degree 4	Negative	3 to 4
$y=x^2(x+1)^2$		Even – degree 4	Positive	2 to 1
$y=-x^2(x+1)^2$		Even – degree 4	Negative	3 to 4

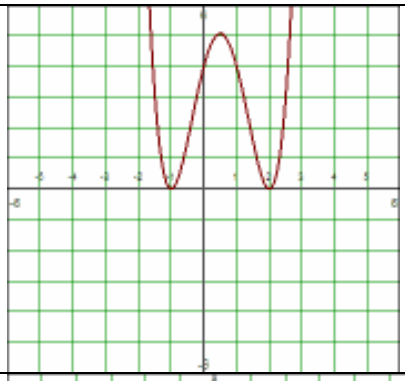
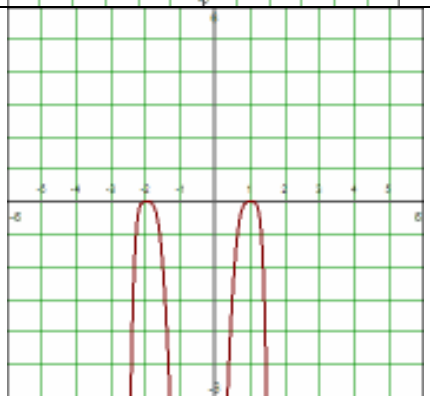
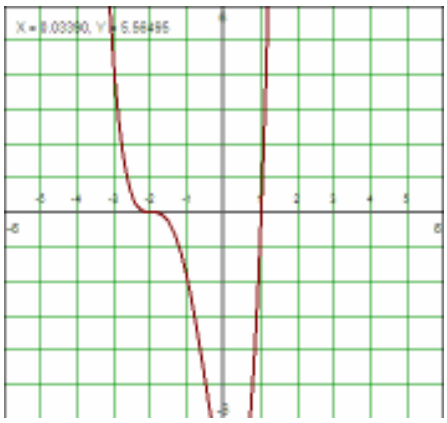
Complete the following sentences:

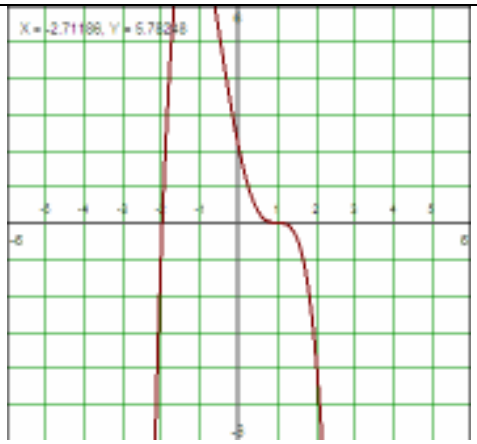
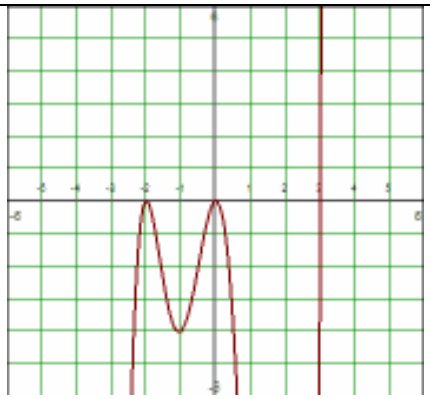
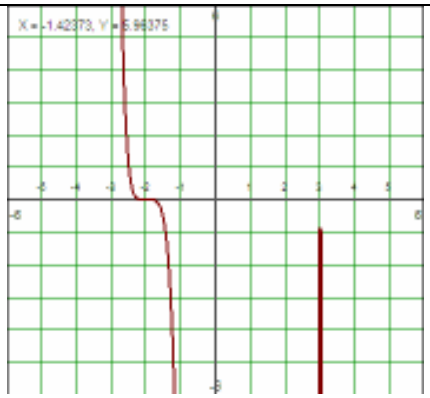
1. When a polynomial function is **even** and **negative,** it starts in quadrant __3___ and end in quadrant _____4___ moving left to right.

2. When a polynomial function is **even** and **positive,** it starts in quadrant __2___ and end in quadrant _____1___ moving left to right.

Time to investigate polynomial functions:

Part 3: Fill-in the chart below and look for any emerging patterns. Use GraphCalc to graph the functions.

Polynomial Functions	Sketch of the function	Degree	Sign (positive or negative function)	Quadrants (left → right)
$y = (x+1)^2(x-2)^4$		Even – degree 4	Positive	2 to 1
$y = -(x-3)^4(x+2)^4$		Even – degree 8	Negative	3 to 4
$y = (x-1)(x+2)^3$		Even – degree 4	Positive	2 to 1

$y = -(x-1)^3(x+2)$		Even	Negative	3 to 4
$y = x^2(x+2)^2(x-3)$		Odd – degree 5	Positive	3 to 1
$y = -(x+2)^5(x-3)^2$		Odd – degree 7	Negative	2 to 4

Complete the following sentences:

1. When a polynomial function has a repeated **even** root, the graph of the function ___bounces_____ at that root.

2. When a polynomial function has a repeated **odd** root greater than 1, the graph of the function ____bends____ at that root.